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GUARD FOR A POWER TOOL, POWER TOOL, AND SYSTEM COMPRISING A
GUARD AND POWER TOOL

Related Art

5 The present invention is directed to a guard for a power tool, a power tool, and a system composed of guard and power tool according to the descriptions of the species in the independent claims.

It is known to provide guards for power tools with rotatably driven insertion tools - angle grinders in particular - to protect an operator from injury that could occur if
10 the insertion tool shatters and fragments are slung outward.

Advantages of the Invention

The present invention is directed to a guard for a power tool with a rotatably driven insertion tool, with which at least portions of the insertion tool can be covered.

15 According to the present invention, at least one blocking means is provided that at least prevents the insertion tool from turning around an axis of rotation. As a result, protection against contact with the insertion tool is improved and a protective function against a shattering of the insertion tool is ensured. As a result, fragments slung off of the shattered insertion tool are prevented from rotating the guard on the
20 drive shaft so far that the fragments pose a risk to an operator. If damage occurs, the blocking of the guard rotation is independent of a tightening torque used to attach the guard.

The blocking means is preferably formed by a stop cam in a flange designed for fastening that extends substantially parallel to the axis of rotation. The guard is
25 installed with the flange on the power tool, thereby enabling a space-saving and easy-to-handle arrangement of the rotation-prevention means. The stop cam can point inward. An arrangement with an outwardly-oriented stop cam is also possible.

One skilled in the art will select an arrangement that is suitable for the power tool being used.

If the blocking means is formed by a stop cam in a clamp connected with the flange, a high degree of safety can be obtained using means that are easy to manufacture.

5 The rotation-prevention means is not dependent on a clamping force given by a tightening torque of an attachment screw used to attach the clamp to a collar. The rotation-prevention means is effective even if the attachment screw was accidentally under-tightened. If the stop cam hits a stop, the guard is held securely in this position.

10 If the stop cam, in the installed state, points toward a collar, a corresponding stop can be provided on the collar of the power tool. The entire rotation-prevention means is located inside the guard.

If the blocking means is formed by an outwardly-projecting blocking lug on the guard, it can be machined – economically and easily – directly out of the sheet
15 metal of the guard. As an option, the blocking lug can also be welded on, adhesively bonded or screwed into place. The blocking lug can also be installed as a retrofit. Preferably, the blocking lug can project outward. As an alternative, it can also point inward, in a suitable location.

If the blocking lug is located on the flange, the rotation-prevention means can be
20 positioned in a space-saving manner.

The blocking lug can also be located on a surface extending substantially perpendicular to the axis of rotation, adjacent to an opening for a drive shaft of the insertion tool to be covered by the guard. As a result, the blocking lug advantageously does not extend into the operator's working area.

25 The present invention also relates to a power tool with an electric motor located in a housing, the electric motor rotatably driving the insertion tool.

According to the present invention, a rotation-prevention means is provided that at least prevents the insertion tool from being released in the direction of an operator.

The guard can be limited, at the least, from rotating around an axis of rotation of the insertion tool. As a result, protection against contact with the insertion tool is improved and a protective function against a shattering of the insertion tool is ensured. As a result, fragments slung off of the shattered insertion tool are prevented from rotating the guard on the drive shaft so far that the fragments pose a risk to an operator.

If the rotation-prevention means includes a stop means that corresponds with the blocking means, rotation of the guard can be limited to a narrow angular range, or it can be prevented entirely.

If a collar includes a guide groove with a limiting groove located at an angle thereto, a clamp with a stop cam pressed through on its inside can be inserted. The guard can only be rotated within the limiting groove; this limits the angular range of the guard. The guard can be fixed in any position in the limiting groove.

If a stop that projects outward at an angle is provided on the housing, a blocking lug and/or a stop cam can hit it, and the guard can be prevented from rotating in an undesired manner.

The present invention also relates to a system composed of guard and power tool.

According to the present invention, a rotation-prevention means is provided with a blocking means on the guard side and with a corresponding stop means on the power tool side. The blocking means can be an integral part of the guard, e.g., a blocking lug or a cam, or it can be provided on a fastening device with which the guard is connected with the power tool. The guard is reliably prevented from rotating past the stop. By aligning the blocking means and stop means accordingly, an angular range within which rotation is permitted can be actively specified.

If the rotation-prevention means can be triggered by the insertion tool acting on the guard, the operator's safety can be ensured in case of maloperation. The guard can be rotated, at the most, within an angular range in which safety is still ensured. Installation of the guard in a position that is common for normal operation of the

power tool is not prevented.

Particularly preferably, the power tool is designed as an angle grinder, the grinding disc of which is covered by a guard, at least in some areas. If the grinding disc shatters, the guard can no longer be driven by the fragments in the original direction of rotation so far that the operator could be struck by fragments. The rotation-prevention means is independent of a tightening torque used to attach the guard to a collar.

Drawing

- Further advantages result from the description of the drawing, below. Two exemplary embodiments of the present invention are shown in the drawing. The drawing, the description and the claims contain numerous features in combination. One skilled in the art will also advantageously consider the features individually and combine them to form further reasonable combinations.
- Figure 1 Shows a preferred angle grinder,
 - Figure 2 Shows a schematic depiction of a side view according to a first exemplary embodiment,
 - Figure 3 Shows a depiction of a maximum angular range of rotation of the guard,
 - Figure 4 Shows a schematic view of a clamp for attaching the guard,
 - Figure 5 Shows a top view of a guard with clamp,
 - Figure 6 Shows a rotation-prevention means according to a second exemplary embodiment.

Detailed Description of the Exemplary Embodiments

A power tool designed as a preferred angle grinder is shown in Figure 1. An electric motor (not shown) is located in a housing 10, the electric motor rotatably driving an insertion tool 14, which is a grinding disc in this case. With an angle grinder, an output shaft of the electric motor is usually positioned perpendicularly to a drive shaft of the insertion tool. The angle grinder can be held and guided using a handle 12 that projects outwardly at an angle. A guard 16 covers insertion tool 14 to the extent that protection against contact by an operator is ensured. Guard 16 is designed as a semicircle with a flange on the periphery, the flange extending downward at the periphery and covering half of the surface and the edge of grinding disc 14. Guard 16 includes, e.g., a flange 30 projecting upwardly from the center of its imaginary circular area and extending substantially parallel to an axis of rotation 18, with a clamp 26 attached thereto, and is fixed to a collar 24 by way of said clamp 26 (Figures 2-5).

To ensure - if insertion tool 14 shatters – that guard 16 is not rotated so far that fragments can strike the operator, a rotation-prevention means 20 is provided according to the present invention that at least limits guard 16 from rotating around an axis of rotation of insertion tool 14 and/or collar 24.

Figures 2 through 5 show a first preferred exemplary embodiment of a rotation-prevention means 20. In the figures, components that are basically identical are all labeled with the same reference numerals. A blocking means in the form of a stop cam 32 is provided, on the guard side, on a collar 24 of a drive shaft 22, the blocking means being formed in a clamp 26 for attaching a guard 16 to collar 24, and which is pressed through toward the inside of clamp 26 (Figure 4). An insertion groove 36 with a limiting groove 34 extending substantially perpendicular thereto is provided in collar 24, the limiting groove forming a stop means that corresponds with stop cam 32. If guard 16 is rotated when insertion tool 14 shatters, limiting groove 34 limits a possible rotation around an axis of rotation 18 to an angular range α (Fig. 3). The rotation is blocked independently of a torque used to tighten

an attachment screw 28 used to fix clamp 26 around collar 24, the rotation being blocked by one end or the other end of limiting groove 34.

Clamp 26 is shown in greater detail in Figure 4. Clamp 26 surrounds a flange 30 that projects outward from guard 16 and fixedly clamps flange 30 of guard 16 to collar 24 of drive shaft 22. To install guard 16, stop cam 32 is guided via insertion groove 36 into limiting groove 34. Attachment screw 28 is screwed into a screw receptacle 38. By tightening attachment screw 28, guard 16 can be clamped more or less tightly to collar 24. Advantageously, limiting groove 34 extends away from insertion groove 36 in the direction of rotation of insertion tool 14. Guard 16 can only be rotated, at a maximum, in angular range α , across which limiting groove 34 extends (Fig. 3).

Figure 5 shows a top view of the arrangement. A suction pipe 44 can also be integrated in guard 16, suction pipe enabling the extraction of dust produced while working with insertion tool 14. Stop cam 32 is pressed through on the inside of clamp 26 with which guard 16 is fixed to collar 24 and extends into limiting groove 34 of collar 24.

A further exemplary embodiment of rotation-prevention means 20 is depicted in Figure 6. In that case, a blocking lug 40 is formed on guard 16 that is formed out of the sheet metal of guard 16 by being partially punched out and bent. As an option, blocking lug 40 can also be welded on, adhesively bonded, or screwed in place. Blocking lug 40 extends outward out of the surface of guard 16 such that it can come in contact with a stop 42 provided on housing 10. Stop 42 can be formed directly in housing 10, or it can be welded on, adhesively bonded, or screwed in place. Stop 42 or blocking lug 40 can also be installed as a retrofit. As an alternative to blocking lug 40, a blocking lug 40' can be created out of a wall of guard 16 oriented perpendicularly to axis of rotation 18 by being partially punched out and bent.

Blocking lug 40 hits stop 42 if guard 16 rotates on collar 24 in the direction of rotation. Guard 16 can be mounted on collar 24 using a common clamp 26. Clamp 26 can also

be equipped with a rotation-prevention means 20 according to the present invention, of the type described with reference to the preceding figures.

Advantageously, guard 16 can be installed such that blocking means 32, 40 are both positioned as closely adjacent to stop means 34, 42 as possible. As a result, guard 16
5 can be prevented from rotating on collar 24, the rotation being induced when insertion tool 14 shatters.

Reference numerals

10	Housing
12	Handle
14	Insertion tool
16	Guard
18	Axis of rotation
20	Rotation-prevention means
22	Drive shaft
24	Collar
26	Clamp
28	Attachment screw
30	Flange
32	Stop cam
34	Limiting groove
36	Insertion groove
38	Screw connection
40	Blocking lug
42	Stop
44	Suction pipe
α	Angle of rotation